Stoller
Hanford Office

DOE-EM/GJ620-2004

C4229
Log Data Report

Borehole Information:

Borehole: C4229			**Site:** 216-U-12 Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Dry		**GWL Date:**	03/17/2004
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
Not Available	Not Available	March 2004	Not Available	50	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	+0.0	6 5/8	5 1/2	9/16	+0.0	50

Borehole Notes:

Zero reference is the ground surface. The logging engineer used a caliper to determine the outside casing diameter. The caliper and casing stickup were both measured using a steel tape. Inside casing diameter was measured with a steel tape. All measurements were rounded to the nearest 1/16 in.

Logging Equipment Information:

Logging System:	Gamma 1G		**Type:** SGLS (35%) 34TP10967A
Calibration Date:	01/2004	**Calibration Reference:**	GJO-2004-597-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 / Repeat		
Date	03/17/04	03/17/04	03/17/04		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	49.14	49.0	13.0		
Finish Depth (ft)	49.14	0	9.0		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	N/A[3]	1.0	1.0		
ft/min	N/A	N/A	N/A		
Pre-Verification	AG051CAB	AG051CAB	AG051CAB		
Start File	AG052000	AG052001	AG052051		
Finish File	AG052000	AG052050	AG052055		
Post-Verification	AG052CAA	AG052CAA	AG052CAA		
Depth Return	N/A	-1	0		

Log Run	1	2	3 / Repeat		
Error (in.)					
Comments	Sonde tip is just touching bottom of borehole.	No fine-gain adjustment.	Repeat section.		

Logging Operation Notes:

Zero reference was ground surface. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118.

Analysis Notes:

Analyst:	Sobczyk	Date:	3/22/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 2.2 percent lower and 0.6 percent higher at the end of the day. Examinations of spectra indicate that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The post-run verification spectrum was used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1GJan04.xls). Zero reference was the ground surface. Based on the field measurements, the casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 49.14 ft (total logging depth). Dead time and water corrections were not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected in the interval between 10 and 11 ft with concentrations ranging from 1.1 pCi/g to 1.2 pCi/g. ^{137}Cs was also detected at the surface (0 ft) with a concentration near the MDL (0.3 pCi/g).

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 609, 1461, 1764, and 2614 keV and for ^{137}Cs at 662 keV.

[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

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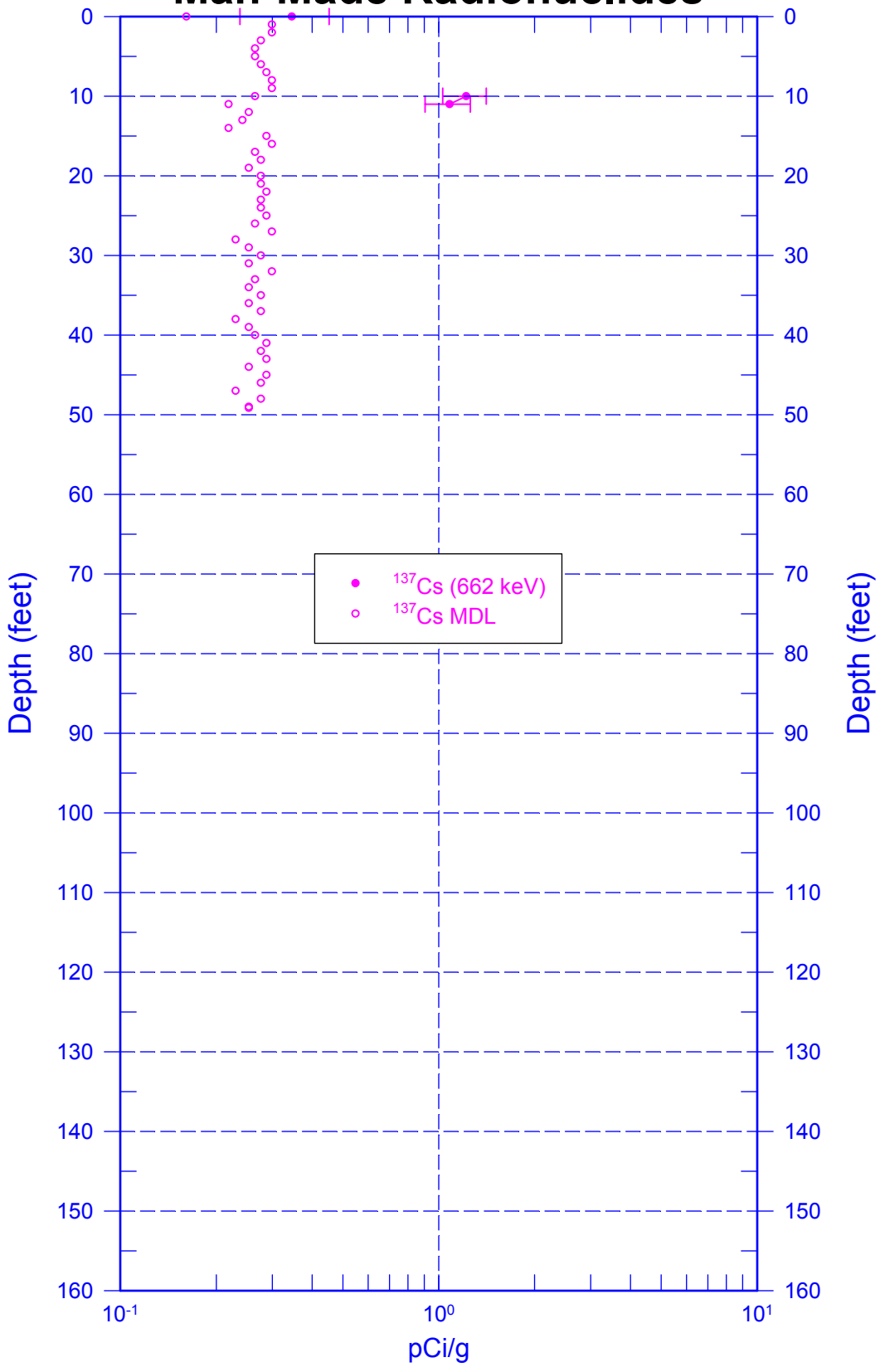
Man-Made Radionuclides



Zero Reference = Ground Surface

Date of Last Logging Run
3/17/2004

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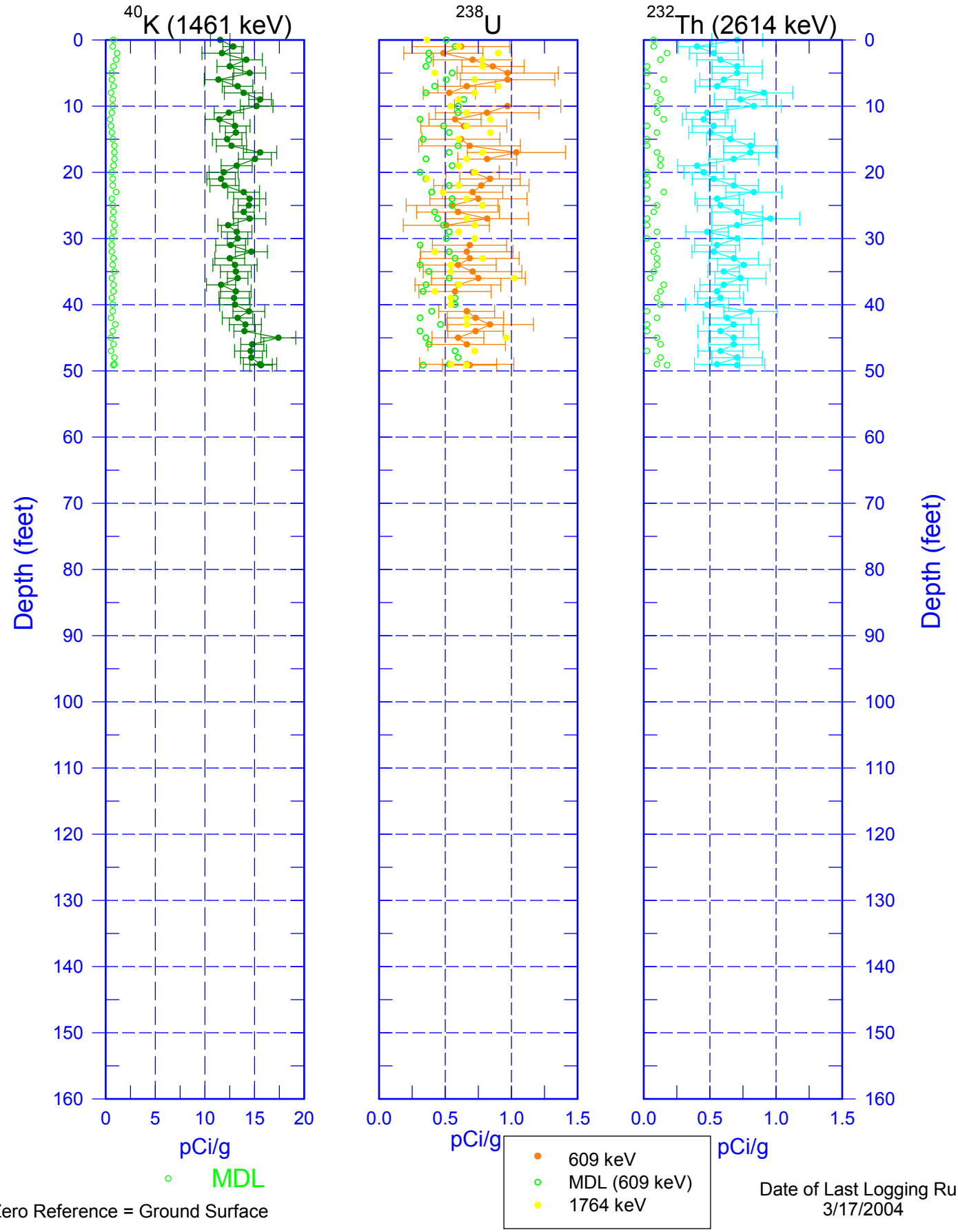
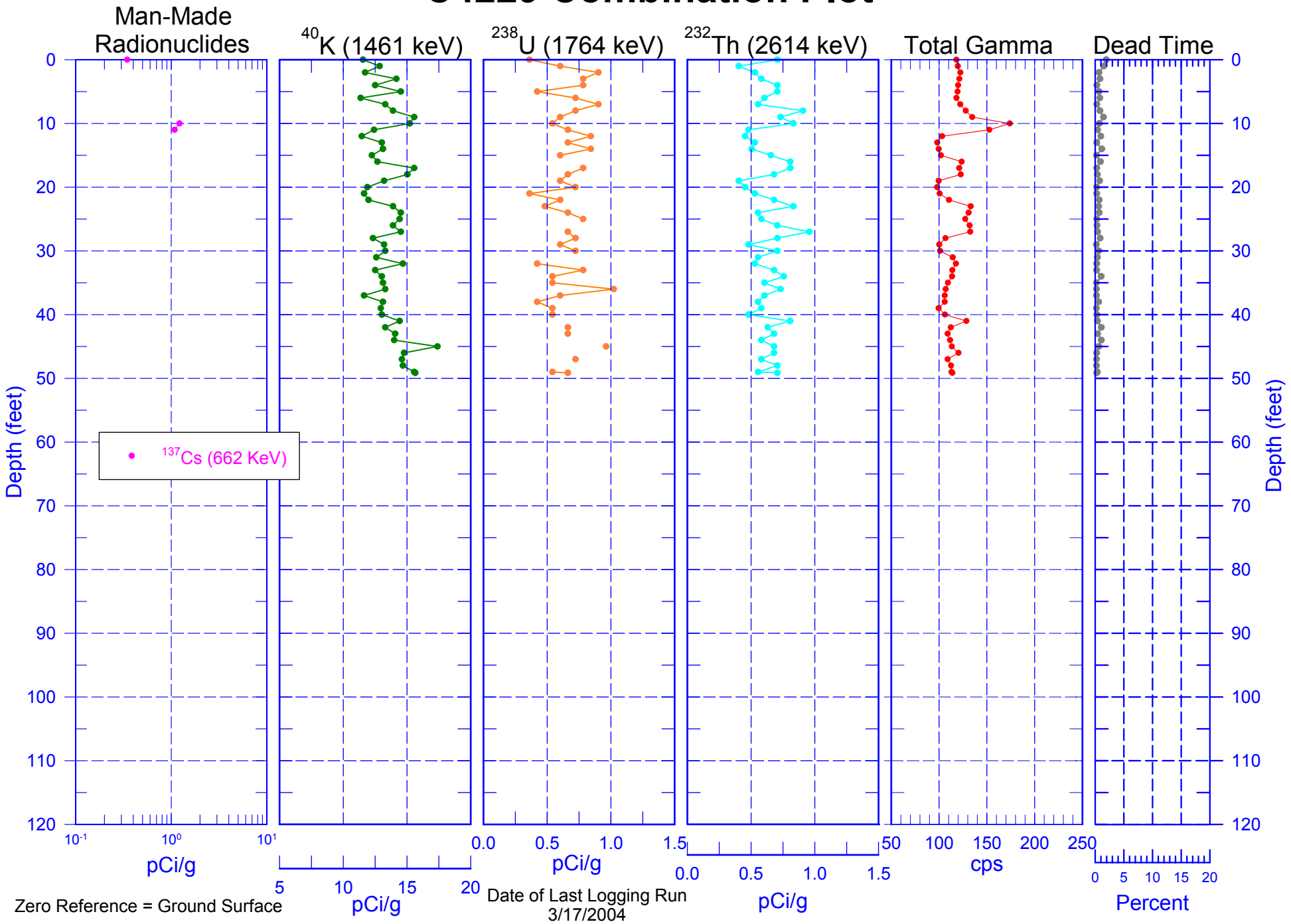
Natural Gamma Logs



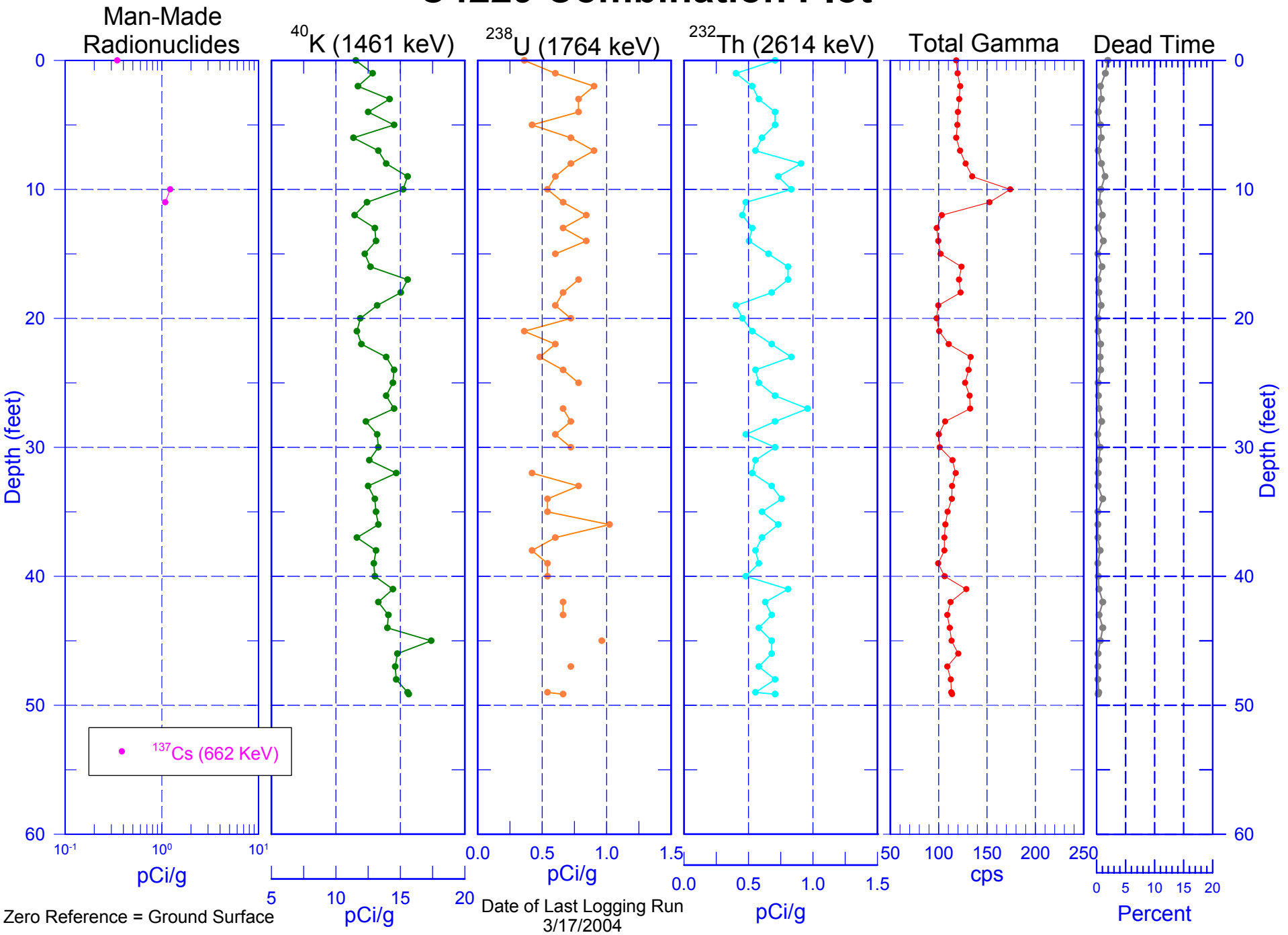
Zero Reference = Ground Surface

Date of Last Logging Run
3/17/2004

C4229 Combination Plot



C4229 Combination Plot



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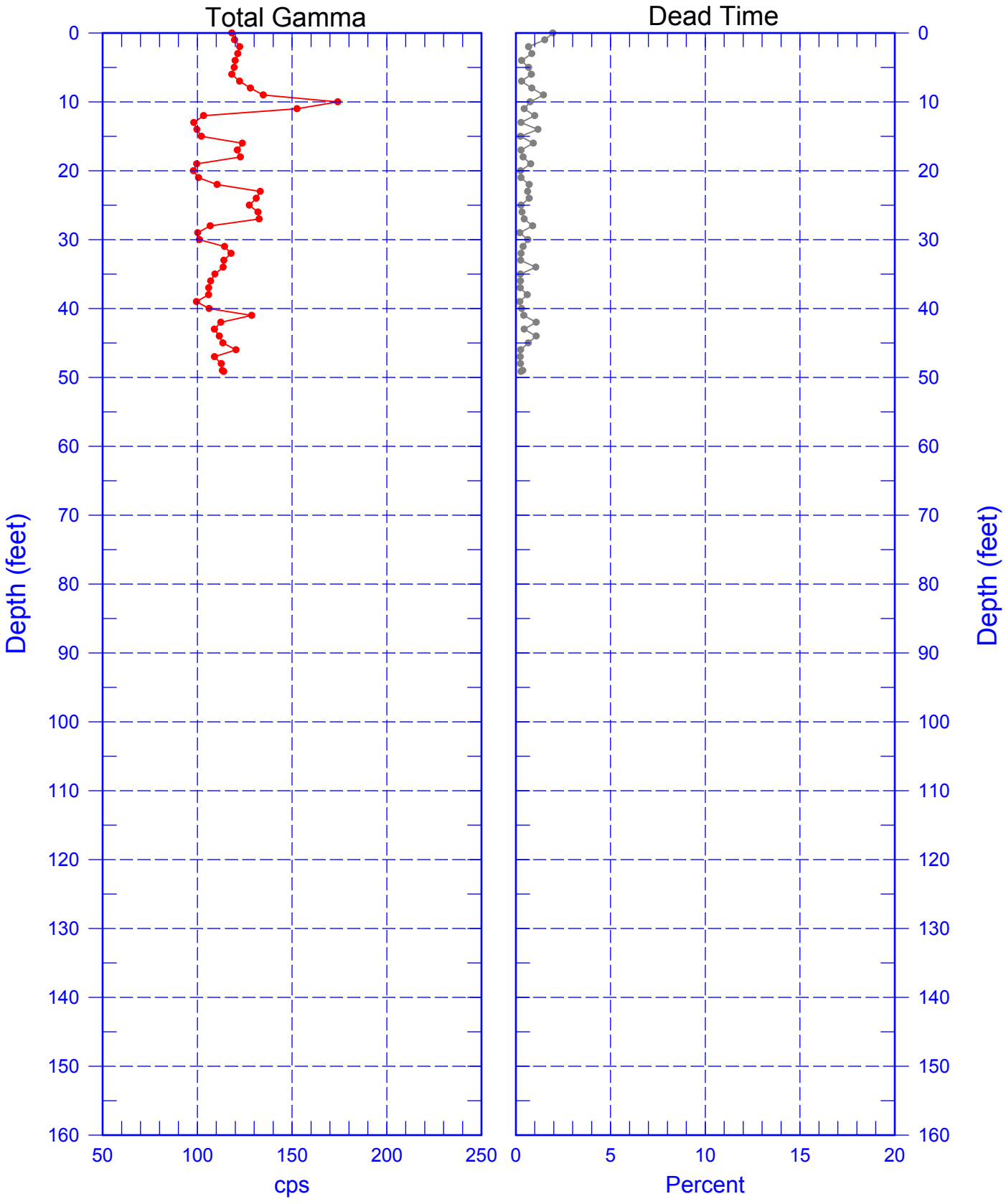
Total Gamma & Dead Time



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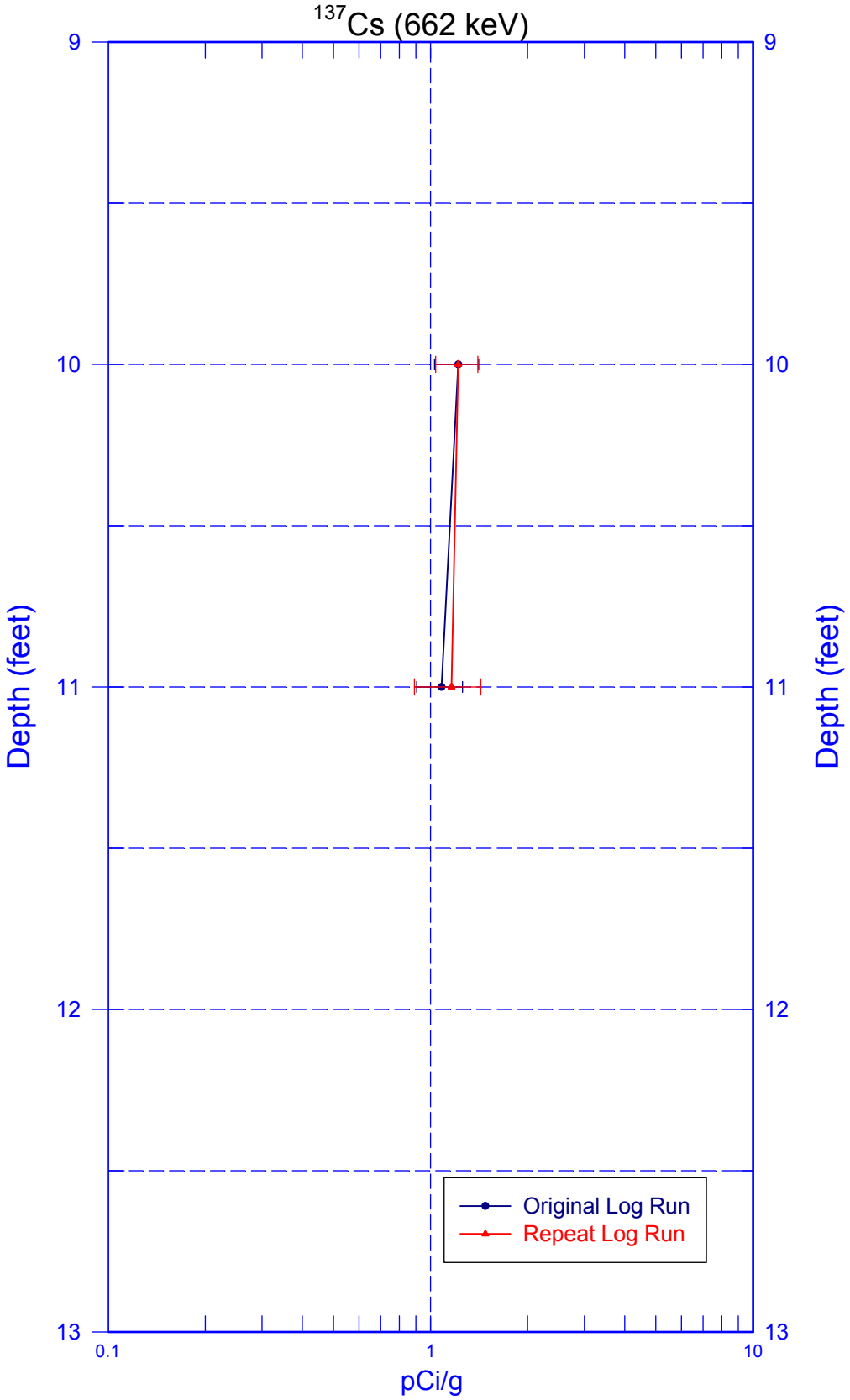
Rerun of Man-Made Radionuclides



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Rerun of Natural Gamma Logs (13.0 to 9.0 ft)